ABSTRACT

A method for forming an ordered array of nanocrystals where a hydrophobic precursor solution with a hydrophobic core material in an organic solvent is added to a solution of a surfactant in water, followed by removal of a least a portion of the organic solvent to form a micellar solution of nanocrystals. A precursor co-assembling material, generally water-soluble, that can co-assemble with individual micelles formed in the micellar solution of nanocrystals can be added to this micellar solution under specified reaction conditions (for example, pH conditions) to form an ordered-array mesophase material. For example, basic conditions are used to precipitate an ordered nanocrystal/silica array material in bulk form and acidic conditions are used to form an ordered nanocrystal/silica array material as a thin film.